

STAFF MEMORANDUM

To: THE COMMISSION

From: Chris Watson
Director
Safety Division

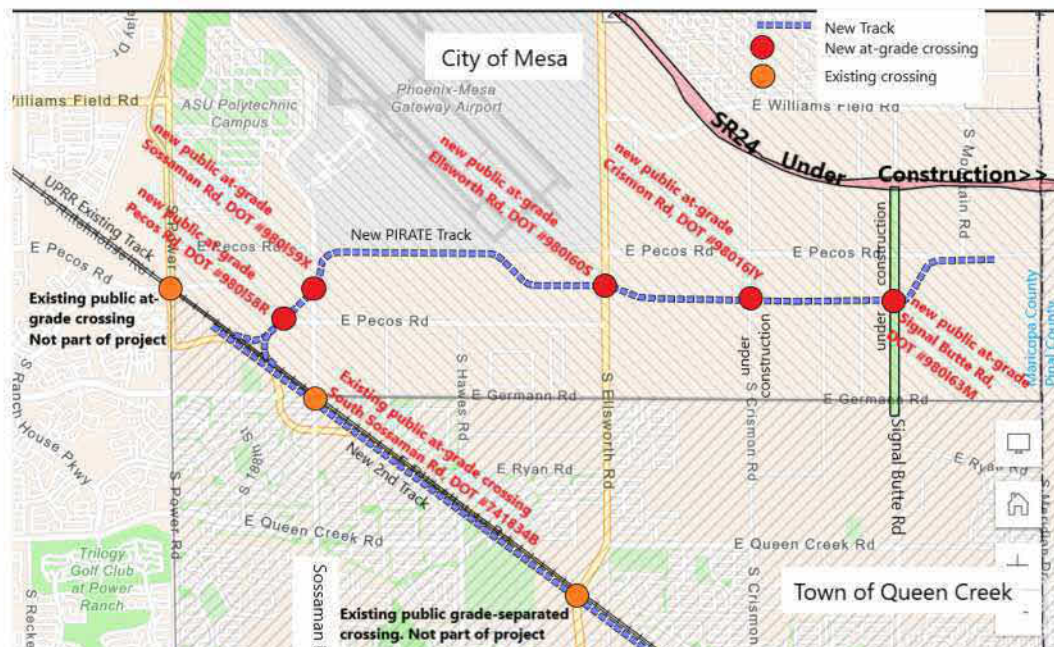
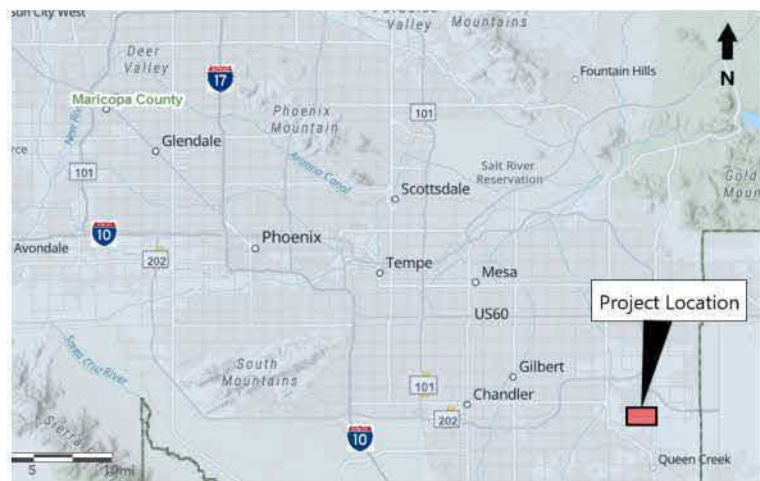
Date: December 15, 2022

RE: IN THE MATTER OF THE APPLICATION OF UNION PACIFIC RAILROAD TO CONSTRUCT FIVE (5) NEW AT-GRADE CROSSINGS ❶ PECOS ROAD, DOT #980158R ❷ SOSSAMAN ROAD, DOT #980159X ❸ ELLSWORTH ROAD, DOT #980160S ❹ CRISMON ROAD, DOT #980161Y, AND ❺ SIGNAL BUTTE ROAD, DOT #980163M AND IMPROVE ONE (1) EXISTING AT-GRADE CROSSING ❻ SOUTH SOSSAMAN ROAD, DOT #741834B AS PART OF UNION PACIFIC'S PROPOSED PIRATE LINE IN MESA, ARIZONA

DOCKET NO. RR-03639A-22-0287

Background and Project Overview

On November 15, 2022, the Union Pacific Railroad Company ("Railroad") filed with the Arizona Corporation Commission ("Commission") a request for approval to construct five (5) new at-grade crossings-Pecos Road, DOT#980158R, Sossaman Road, DOT#980159X, Ellsworth Road, DOT#980160S, Crismon Road, DOT#980161Y, and Signal Butte Road, DOT#980163M and improve one (1) existing at-grade crossing at south Sossaman Road, DOT#741834B as part of Union Pacific's proposed PIRATE line in the City of Mesa, Arizona (City). PIRATE: Pecos Industrial Rail Access and Train Extension (Project).



The proposed project builds a new segment of track to serve industrial customers and includes several public crossings. Crossing protection and roadway design elements are noted under each road name and DOT section below.

The Safety Division's Railroad Safety Section, ("Staff"), Railroad and City have reviewed the proposed improvements to these crossings. All parties present participated in a diagnostic meeting and a workshop with the Commission. Parties are in agreement that the at-grade crossing designs are similar to other at-grade crossings in the state and are in the public interest as presented in the application. However, Staff will detail its own recommendation for consideration at the new Ellsworth Road crossing. These differences between parties have been documented as part of the diagnostic team process.

Overall Project Cost

Railroad's application does not outline specific costs for the project but indicates that *Union Pacific will bear the cost of all improvements to be made at the crossings affected by this Application.*

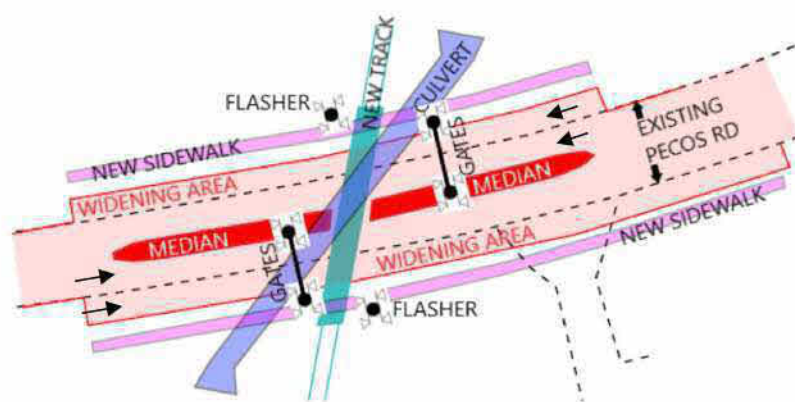
Overall Vehicular Delays at Crossings: (Source Traffic Impact Analysis Study, UPRR PIRATE Industrial Lead, Mesa, AZ 9/23/2022):

Railroad provided a detailed answer to the magnitude of traffic delays throughout the PIRATE corridor. The following answer contains elements that apply to all the crossings in the scope of that study. *According to these (Level of Service) LOS measurements the operations during peak season at some study intersections are at or worse than industry standards. Intersection LOS measures are a result of vehicular traffic and a proposed railroad crossing on Ellsworth Road is not expected to worsen these LOS values. As detailed in the Southeast Mesa Land Use and Transportation Plan (2019), potential mitigation measures have already been identified to improve capacity and decrease delay. The City of Mesa has determined that near-term widening Ellsworth Road from four to six lanes in the near term will greatly improve traffic operations through this corridor. The Ellsworth Road crossing is planned to meet the future roadway width, consistent with the City's overall Ellsworth Road widening.*

Pecos Road, DOT#980158R, Mesa, AZ

Pecos Rd. is currently used for two-way traffic. There is one through westbound lane and one eastbound lane. No railroad crossing is installed.

The proposed project will widen the existing road from 2 to 4 lanes with 16ft raised median, a portion of the new single track and a new at-grade crossing. This project only builds a 250ft portion of the ultimate condition at the crossing location and future development will improve the rest of existing road. This proposed crossing has gates on the outside edges of the road and in medians.



New gates on the east side need to be placed further than Railroad's standard of 15 from center of track due to the drainage culvert passing under the roadway (*). UP is unable to place the gates on top of the culvert. This increased distance from the gate to the crossing (clearance time) has been considered in the signal design and adequate warning time is provided. The existing two lane section tapers into the new median section and future lanes will be striped to prevent use. Railroad signals will cover the ultimate condition. For bike lanes, the project will also add off-quadrant flashers and apply 90 degree approach geometry. **These proposed measures are consistent with safety measures employed at**

similar at-grade crossings in the state. The Railroad will maintain the warning devices and crossing surface after the upgrades are completed. City will maintain the signing, striping and roadway approaches outside the Railroad's right of way.

() New land acquisition and track geometry constraints are driving the location of the road/track intersection and existing drainage patterns and land formation necessitate the location of the culvert.*

Traffic data *(Source Traffic Impact Analysis Study, UPRR PIRATE Industrial Lead, Mesa, AZ 9/23/2022):* 14,190 vehicles per day ("VPD") at this crossing in 2022.

Level of Service ("LOS"): Minimal Congestion (LOS C or better)

The American Association of State Highway and Transportation Officials ("AASHTO") Geometric Design of Highways and Streets, 2004, states that the Level of Service characterizes the operating conditions on a facility in terms of traffic performance measures related to speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. This is a measure of roadway congestion ranging from LOS A--least congested--to LOS F--most congested. LOS is one of the most common terms used to describe how "good" or how "bad" traffic is projected to be.

Posted speed Limit: 45mph

Accidents/Incidents: New crossing. No relevant data.

Alternative routes: to the west 1/2 mile, Power Rd./Pecos Rd. (DOT# 741833U at grade).

Train Data *(Source (1)Applicant and (2)Traffic Impact Analysis Study, 9/23/2022):*

Per applicant (1) *Union Pacific anticipates that it would run one (1) local industrial train per day, traveling each direction, on the PIRATE Line, five (5) days a week, with an average carload of 32 cars per train. Union Pacific does not anticipate regularly conducting switching operations over any of the proposed new or modified crossings. (2) Trains along this industrial lead are expected to be between 1,500 feet and 3,000 feet long.*

Number of Tracks: 1 track

Train Count: 1 inbound and 1 outbound train per day – 5 days /week with no passenger service

Maximum Train Speed: 20mph

Thru Freight/Switching Moves: No switching movements through this crossing

Train Detection: Constant Warning Time

FRA Inventory Form: (<https://safetydata.fra.dot.gov/OfficeofSafety/PublicSite/Crossing/Crossing.aspx>)

Railroad Portion (Part II): To be updated upon completion

State Portion (Part I, III, IV and V): To be updated upon completion

Schools Near Crossing:

- | | |
|------------------------------------|--|
| • ASU Preparatory Polytechnic STEM | 6950 E Williams Field Rd, Mesa, AZ 85212 |
| • Heritage Academy Gateway | 19705 E Germann Rd, Queen Creek, AZ 85142 |
| • Centennial Elementary School | 3507 S Ranch House Pkwy, Gilbert, AZ 85297 |

School Bus Routes *(Source Queen Creek Unified School District):*

School busses cross through the area of the crossing between 150-200 crossings per day.

Hospitals Near Crossing:

- | | |
|---|--------------------------------------|
| 1. East Valley ER & Hospital | 5656 S Power Rd, Gilbert, AZ 85295 |
| 2. Emergency Room at Arizona General Hospital | 4760 E Germann Rd, Gilbert, AZ 85297 |

Hazardous Materials

By Rail

Union Pacific's PIRATE Line currently has one active customer CMC Steel Arizona. According to the applicant *this company transport raw/source materials from its suppliers and vendors* (www.cmc.com)

6/7/2022 2:49pm virtual meeting captured chat: *UP has no existing customers near the mainline Mile Post that ships/receives hazmat* (Shelly Huckfeldt)

By Truck

Pecos Rd. is not listed on the National Hazardous Material Route Registry

Zoning (Source Traffic Impact Analysis Study, UPRR PIRATE Industrial Lead, Mesa, AZ 9/23/2022):

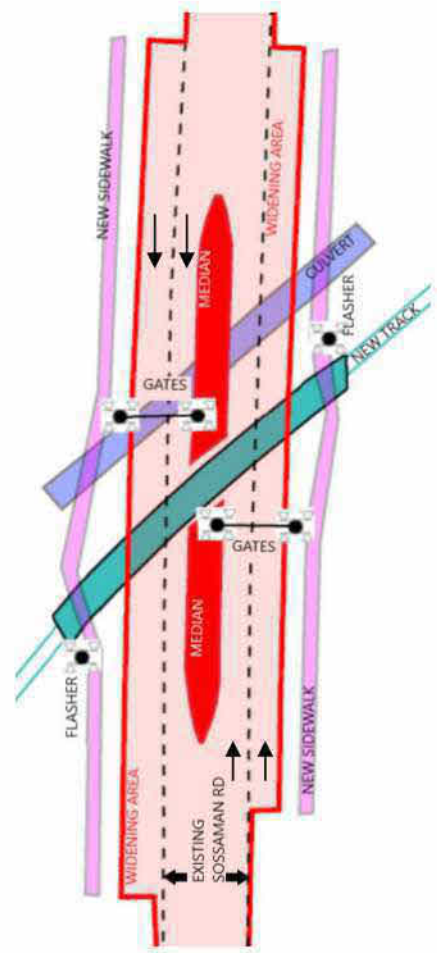
Light Industrial and Agricultural

Sossaman Road, DOT#980159X, Mesa, AZ

Sossaman Rd. is currently used for two-way traffic. There is one through northbound lane and one southbound lane. No railroad crossing is installed.

The proposed project will widen the existing road from 2 to 4 lanes with 16ft raised median, a portion of the new single track and a new at-grade crossing. This project only builds a 250ft portion of the ultimate condition at the crossing location and future development will improve the rest of existing road. This proposed crossing has gates on the outside edges of the road and in medians. New gates on the north side need to be placed further than Railroad's standard of 15ft from center of track due to the drainage culvert passing under the roadway (*). UP is unable to place the gates on top of the culvert. This increased distance from the gate to the crossing (clearance time) has been considered in the signal design and adequate warning time is provided. The existing two lane section tapers into the new median section and future lanes will be striped to prevent use. Railroad signals will cover the ultimate condition. For bike lanes, the project will also add off-quadrant flashers and apply a closer to 90 degree approach geometry. **These proposed measures are consistent with safety measures employed at similar at-grade crossings in the state.** The Railroad will maintain the warning devices and crossing surface after the upgrades are completed. City will maintain the signing, striping and roadway approaches outside the Railroad's right of way.

(*) New land acquisition and track geometry constraints are driving the location of the road/track intersection and existing drainage patterns and land formation necessitate the location of the culvert.



Traffic data (Source Traffic Impact Analysis Study, UPRR PIRATE Industrial Lead, Mesa, AZ 9/23/2022): 6,142 vehicles per day ("VPD") at this crossing in 2022.

Level of Service ("LOS"): Minimal Congestion (LOS C or better)

Posted speed Limit: 45mph

Accidents/Incidents: New crossing. No relevant data.

Alternative routes: Track is new. Work phasing and detours will be determined closer to construction.

Train Data (Source (1)Applicant and (2)Traffic Impact Analysis Study, 9/23/2022):

Per applicant (1) *Union Pacific anticipates that it would run one (1) local industrial train per day, traveling each direction, on the PIRATE Line, five (5) days a week, with an average carload of 32 cars per train. Union Pacific does not anticipate regularly conducting switching operations over any of the proposed new or modified crossings. (2) Trains along this industrial lead are expected to be between 1,500 feet and 3,000 feet long.*

Number of Tracks: 1 track

Train Count: 1 inbound and 1 outbound train per day – 5 days /week with no passenger service

Maximum Train Speed: 20mph

Thru Freight/Switching Moves: No switching movements through this crossing

Train Detection: Constant Warning Time

FRA Inventory Form: (<https://safetydata.fra.dot.gov/OfficeofSafety/PublicSite/Crossing/Crossing.aspx>)

Railroad Portion (Part II): To be updated upon completion

State Portion (Part I, III, IV and V): To be updated upon completion

Schools Near Crossing:

- | | |
|------------------------------------|--|
| • ASU Preparatory Polytechnic STEM | 6950 E Williams Field Rd, Mesa, AZ 85212 |
| • Heritage Academy Gateway | 19705 E Germann Rd, Queen Creek, AZ 85142 |
| • Centennial Elementary School | 3507 S Ranch House Pkwy, Gilbert, AZ 85297 |

School Bus Routes (Source Queen Creek Unified School District):

District indicated no school bus routes in the area of this crossing.

Hospitals Near Crossing:

- | | |
|---|--------------------------------------|
| 3. East Valley ER & Hospital | 5656 S Power Rd, Gilbert, AZ 85295 |
| 4. Emergency Room at Arizona General Hospital | 4760 E Germann Rd, Gilbert, AZ 85297 |

Hazardous Materials

By Rail

Union Pacific's PIRATE Line currently has one active customer CMC Steel Arizona. According to the applicant *this company transport raw/source materials from its suppliers and vendors (www.cmc.com)*

6/7/2022 2:49pm virtual meeting captured chat: *UP has no existing customers near the mainline Mile Post that ships/receives hazmat (Shelly Huckfeldt)*

By Truck

Sossaman Rd. is not listed on the National Hazardous Material Route Registry

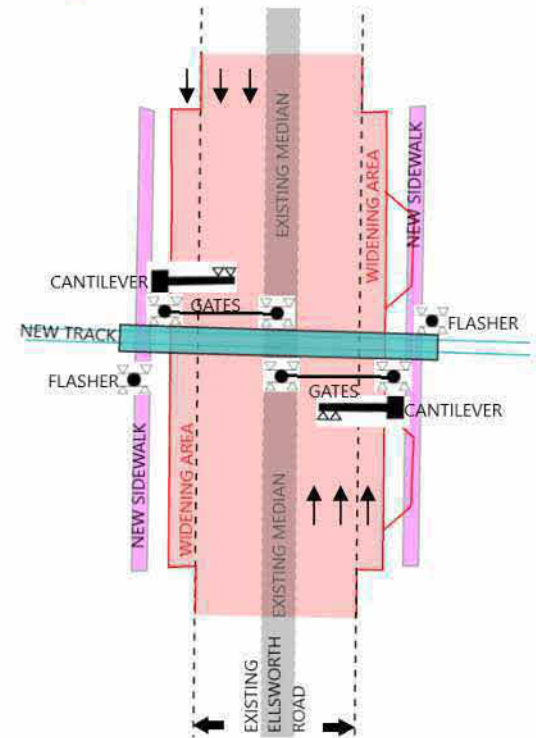
Zoning (Source Traffic Impact Analysis Study, UPRR PIRATE Industrial Lead, Mesa, AZ 9/23/2022):

Light Industrial and Agricultural

Ellsworth Road, DOT#980160S, Mesa, AZ

Ellsworth Rd. is currently used for two-way traffic. There are 4 lanes total-two through northbound lanes and two southbound lanes with a raised median. No railroad crossing is installed.

The proposed project will widen the existing road from 4 to 6 lanes and retain the existing raised median. It will also construct a portion of the new single track and a new at-grade crossing. This project only builds a 300ft portion of the ultimate condition at the crossing location and future development will address the existing road with possible widening. This proposed crossing has gates on the outside edges of the road and in medians. New cantilevers on both approaches will provide a set of lights for the center lanes. The existing 2 lane section tapers into the new 3 lane/median section and future lanes will be striped to prevent use. Railroad signals will cover the ultimate condition. For bike lanes, the project will also add off-quadrant flashers and apply a 90 degree approach geometry. The State Route 24 connection at Ellsworth north is already complete and serves as a north-south connector through Mesa and Queen Creek. There is also an existing traffic light at Ellsworth and Old Pecos-about 1000ft north of the tracks. This is beyond the current limit of 200ft which would indicate the need for traffic preemption at this crossing but will be monitored. The Railroad will maintain the warning devices and crossing surface after the upgrades are completed. City will maintain the signing, striping and roadway approaches outside the Railroad's right of way.



These proposed measures are consistent with safety measures employed at similar at-grade crossings in the state. **However, Staff recommends grade-separation at this location as the best choice for the driving public.**

Traffic data (Source *Traffic Impact Analysis Study, UPRR PIRATE Industrial Lead, Mesa, AZ 9/23/2022*): 59,211 vehicles per day ("VPD") at this crossing in 2022.

Level of Service ("LOS"): Near Capacity (LOS E)

Posted speed Limit: 50mph

Accidents/Incidents: New crossing. No relevant data.

Alternative routes: Track is new. Work phasing and detours will be determined closer to construction.

Train Data (Source (1) *Applicant and (2) Traffic Impact Analysis Study, 9/23/2022*):

Per applicant (1) *Union Pacific anticipates that it would run one (1) local industrial train per day, traveling each direction, on the PIRATE Line, five (5) days a week, with an average carload of 32 cars per train. Union Pacific does not anticipate regularly conducting switching operations over any of the proposed new or modified crossings. (2) Trains along this industrial lead are expected to be between 1,500 feet and 3,000 feet long.*

Number of Tracks: 1 track

Train Count: 1 inbound and 1 outbound train per day – 5 days /week with no passenger service

Maximum Train Speed: 20mph

Thru Freight/Switching Moves: No switching movements through this crossing

Train Detection: Constant Warning Time

FRA Inventory Form: (<https://safetydata.fra.dot.gov/OfficeofSafety/PublicSite/Crossing/Crossing.aspx>)

Railroad Portion (Part II): To be updated upon completion

State Portion (Part I, III, IV and V): To be updated upon completion

Schools Near Crossing:

- | | |
|------------------------------------|--|
| • ASU Preparatory Polytechnic STEM | 6950 E Williams Field Rd, Mesa, AZ 85212 |
| • Heritage Academy Gateway | 19705 E Germann Rd, Queen Creek, AZ 85142 |
| • Centennial Elementary School | 3507 S Ranch House Pkwy, Gilbert, AZ 85297 |

School Bus Routes (Source Queen Creek Unified School District):

School busses cross through the area of the crossing between 150-200 crossings per day.

Hospitals Near Crossing:

- | | |
|---|--------------------------------------|
| 5. East Valley ER & Hospital | 5656 S Power Rd, Gilbert, AZ 85295 |
| 6. Emergency Room at Arizona General Hospital | 4760 E Germann Rd, Gilbert, AZ 85297 |

Hazardous Materials

By Rail

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By Truck

Ellsworth Rd. is not listed on the National Hazardous Material Route Registry

Zoning (Source Traffic Impact Analysis Study, UPRR PIRATE Industrial Lead, Mesa, AZ 9/23/2022):

Light Industrial and Limited Commercial

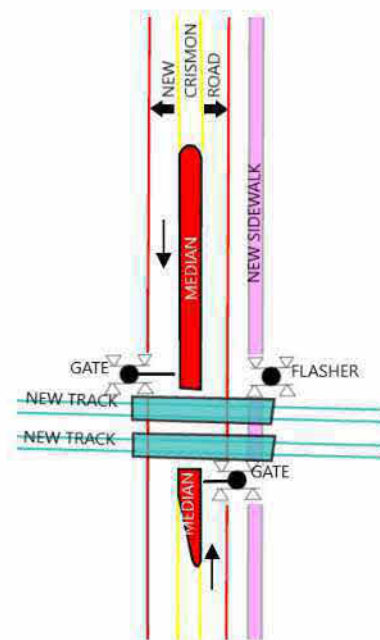
Crismon Road, DOT#980161Y, Mesa, AZ

Crismon Rd. was a dirt road providing farm access as of June 2022 (diagnostic meeting date). No railroad crossing is installed.

The proposed project will construct a 3-lane road connecting E. Pecos Rd and Germann Rd., a portion of the new double track and a new at-grade crossing. The road will have two through lanes - 1 northbound and 1 southbound, the 3rd lane (center) has raised medians on both sides, and yellow median stripes beyond. Crossing protection includes gates at the outside edges of road - both approaches and a pedestrian flasher off-quadrant. This road does not connect to SR24.

Future construction phases are intended to widen the road and adjust the railroad signal accordingly. Not considered as part of this application.

These proposed measures are consistent with safety measures employed at similar at-grade crossings in the state. The Railroad will maintain the warning devices and crossing surface after the upgrades are completed. City will maintain the signing, striping and roadway approaches outside the Railroad's right of way.



Traffic data: No existing roadway.

Level of Service ("LOS"): No existing roadway.

Posted speed Limit: 45mph

Accidents/Incidents: New crossing. No relevant data.

Alternative routes: Track is new. Work phasing and detours will be determined closer to construction.

Train Data (Source (1)Applicant and (2)Traffic Impact Analysis Study, 9/23/2022):

Per applicant (1) *Union Pacific anticipates that it would run one (1) local industrial train per day, traveling each direction, on the PIRATE Line, five (5) days a week, with an average carload of 32 cars per train. Union Pacific does not anticipate regularly conducting switching operations over any of the proposed new or modified crossings. (2) Trains along this industrial lead are expected to be between 1,500 feet and 3,000 feet long.*

Number of Tracks: 1 track

Train Count: 1 inbound and 1 outbound train per day – 5 days /week with no passenger service

Maximum Train Speed: 20mph

Thru Freight/Switching Moves: No switching movements through this crossing

Train Detection: Constant Warning Time

FRA Inventory Form: (<https://safetydata.fra.dot.gov/OfficeofSafety/PublicSite/Crossing/Crossing.aspx>)

Railroad Portion (Part II): To be updated upon completion

State Portion (Part I, III, IV and V): To be updated upon completion

Schools Near Crossing:

- | | |
|------------------------------------|--|
| • ASU Preparatory Polytechnic STEM | 6950 E Williams Field Rd, Mesa, AZ 85212 |
| • Heritage Academy Gateway | 19705 E Germann Rd, Queen Creek, AZ 85142 |
| • Centennial Elementary School | 3507 S Ranch House Pkwy, Gilbert, AZ 85297 |

School Bus Routes:

Unknown.

Hospitals Near Crossing:

- | | |
|---|--------------------------------------|
| 7. East Valley ER & Hospital | 5656 S Power Rd, Gilbert, AZ 85295 |
| 8. Emergency Room at Arizona General Hospital | 4760 E Germann Rd, Gilbert, AZ 85297 |

Hazardous Materials

By Rail

Union Pacific's PIRATE Line currently has one active customer CMC Steel Arizona. According to the applicant *this company transport raw/source materials from its suppliers and vendors (www.cmc.com)*

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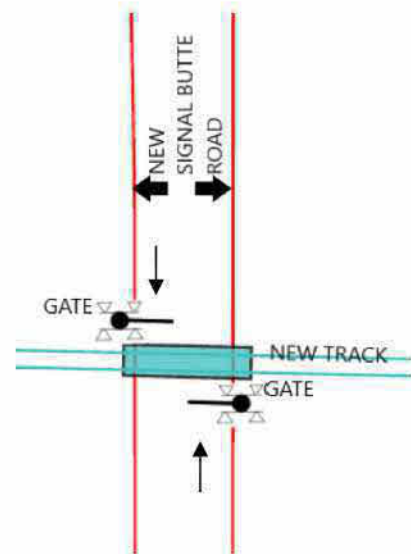
Zoning (Source Traffic Impact Analysis Study, UPRR PIRATE Industrial Lead, Mesa, AZ 9/23/2022:

Light Industrial and General Industrial

Signal Butte Road, DOT#980163M, Mesa, AZ

Signal Butte Road is in construction in phases north-south including an interchange to State Route 24. The limits of the segment being built at the new railroad crossing is from Germann Rd to E. Pecos Rd. The proposed project will construct a 2-lane road, one through lane northbound and southbound, a portion of the new single track and a new at-grade crossing. Crossing protection includes gates at the outside edges of road - both approaches.

These proposed measures are consistent with safety measures employed at similar at-grade crossings in the state. The Railroad will maintain the warning devices and crossing surface after the upgrades are completed. City will maintain the signing, striping and roadway approaches outside the Railroad's right of way.



Traffic data: No existing roadway.

Level of Service ("LOS"): No existing roadway.

Posted speed Limit: 45mph

Accidents/Incidents: New crossing. No relevant data.

Alternative routes: Track is new. Work phasing and detours will be determined closer to construction.

Train Data (Source (1)Applicant and (2)Traffic Impact Analysis Study, 9/23/2022):

Per applicant (1) *Union Pacific anticipates that it would run one (1) local industrial train per day, traveling each direction, on the PIRATE Line, five (5) days a week, with an average carload of 32 cars per train. Union Pacific does not anticipate regularly conducting switching operations over any of the proposed new or modified crossings.* (2) *Trains along this industrial lead are expected to be between 1,500 feet and 3,000 feet long.*

Number of Tracks: 1 track

Train Count: 1 inbound and 1 outbound train per day – 5 days /week with no passenger service

Maximum Train Speed: 20mph

Thru Freight/Switching Moves: No switching movements through this crossing

Train Detection: Constant Warning Time

FRA Inventory Form: (<https://safetydata.fra.dot.gov/OfficeofSafety/PublicSite/Crossing/Crossing.aspx>)

Railroad Portion (Part II): To be updated upon completion

State Portion (Part I, III, IV and V): To be updated upon completion

Schools Near Crossing:

- ASU Preparatory Polytechnic STEM
- Heritage Academy Gateway
- Centennial Elementary School

6950 E Williams Field Rd, Mesa, AZ 85212

19705 E Germann Rd, Queen Creek, AZ 85142

3507 S Ranch House Pkwy, Gilbert, AZ 85297

School Bus Routes:

Unknown.

Hospitals Near Crossing:

9. East Valley ER & Hospital
10. Emergency Room at Arizona General Hospital

5656 S Power Rd, Gilbert, AZ 85295
4760 E Germann Rd, Gilbert, AZ 85297

Hazardous Materials

By Rail

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Zoning (Source Traffic Impact Analysis Study, UPRR PIRATE Industrial Lead, Mesa, AZ 9/23/2022):
Light Industrial and General Industrial

Sossaman Road (South), DOT#741834B, Mesa, AZ

Sossaman Rd. is currently used for two-way traffic. One northbound and one southbound through lanes. The road intersects Germann Rd. immediately north of the crossing at a T intersection. Sossaman traffic north and south does not stop and the Germann intersection is controlled by a stop sign. This crossing currently has gates for both N. and S. at the outside edges of the road and one track.

The proposed project will add a second track. Crossing protection is new gate flasher units on both approaches. On the north side, the new gate in the same location as the existing gate. On the south side a new gate located south of the new track.

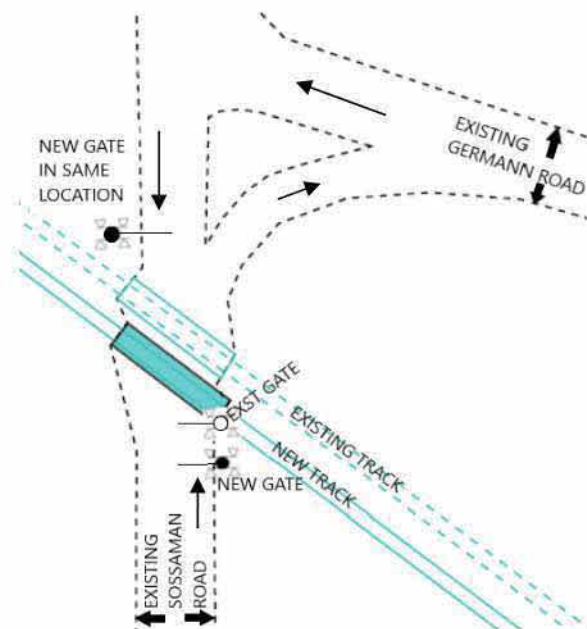
These proposed measures are consistent with safety measures employed at similar at-grade crossings in the state. The Railroad will maintain the warning devices and crossing surface after the upgrades are completed. City will maintain the signing, striping and roadway approaches outside the Railroad's right of way.

Traffic data (Source Traffic Impact Analysis Study, UPRR PIRATE Industrial Lead, Mesa, AZ 9/23/2022):
12,114 vehicles per day ("VPD") at this crossing in 2022.

Level of Service ("LOS"): Near Capacity (LOS E).

Posted speed Limit: 45mph

Accidents/Incidents: (Source FRA and Staff Records): FRA and Staff report no accidents/incidents at this crossing.



Alternative routes: To the NW 1.3 miles, Power Rd./Pecos Rd (DOT# 741833U at-grade) and to the SE 2.3 miles, Ellsworth Rd. (DOT# 924248P) which is grade-separated.

Current Train Data (Source FRA Inventory website):

Number of Tracks: 1 track

Train Count: 4 Trains per day (2 day. 2 night) with no passenger service

Maximum Train Speed: 60 mph

Thru Freight/Switching Moves: No switching movements through this crossing

Train Detection: Constant Warning Time

Train Data with Second Track (Source Traffic Impact Analysis Study, UPRR PIRATE Industrial Lead, Mesa, AZ 9/23/2022):

For the existing Sossaman Road crossing, there is an existing mainline track with 4 trains per day with a maximum train length of 10,000 feet. The PIRATE Industrial Lead will add a track to facilitate trains serving the industrial lead. Two trains will serve the industrial lead with a maximum train length of 3,000 feet. The mainline track will continue to serve the longer trains. Trains are expected to be traveling at the design speed (20 MPH on the PIRATE Industrial Lead track, 60 MPH on the mainline track and 30 MPH on the proposed siding track) through this existing crossing because they are through trains. Therefore, time of train occupancy was estimated based on the UPRR standard warning time prior to train arrival (25 seconds) plus the time it takes for a train of the maximum anticipated train lengths 10,000 feet (Opening Day) and 15,000 feet (2040) traveling at design speed (60 MPH) for mainline trains to clear the crossing. Trains serving the PIRATE Industrial Lead at the existing Sossaman Road crossing were assumed to operate at 20 MPH rather than the design speed of the siding with train lengths of 3,000 feet.

FRA Inventory Form: (<https://safetydata.fra.dot.gov/OfficeofSafety/PublicSite/Crossing/Crossing.aspx>)

Railroad Portion (Part II): To be updated upon completion

State Portion (Part I, III, IV and V): To be updated upon completion

Schools Near Crossing:

- | | |
|------------------------------------|--|
| • ASU Preparatory Polytechnic STEM | 6950 E Williams Field Rd, Mesa, AZ 85212 |
| • Heritage Academy Gateway | 19705 E Germann Rd, Queen Creek, AZ 85142 |
| • Centennial Elementary School | 3507 S Ranch House Pkwy, Gilbert, AZ 85297 |

School Bus Routes (Source Queen Creek Unified School District):

School buses utilize this crossing 1-2 times per day.

Hospitals Near Crossing:

- | | |
|--|--------------------------------------|
| 11. East Valley ER & Hospital | 5656 S Power Rd, Gilbert, AZ 85295 |
| 12. Emergency Room at Arizona General Hospital | 4760 E Germann Rd, Gilbert, AZ 85297 |

Hazardous Materials

By Rail

Union Pacific's PIRATE Line currently has one active customer CMC Steel Arizona. According to the applicant *this company transport raw/source materials from its suppliers and vendors (www.cmc.com)*

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By Truck

Sossaman Rd. is not listed on the National Hazardous Material Route Registry

Zoning (Source Traffic Impact Analysis Study, UPRR PIRATE Industrial Lead, Mesa, AZ 9/23/2022):

City of Mesa - Light Industrial and General Industrial

Town of Queen Creek – Medium Density Residential and General Commercial

Guidelines Regarding Grade Separation (Source Traffic Impact Analysis Study, UPRR PIRATE Industrial Lead, Mesa, AZ 9/23/2022):

The Railroad provided a detailed analysis of three criteria for considering grade separation. Pages are included here for reference.

- | | |
|--|----------------------|
| 1. The nine criteria that Staff includes as part of the crossing establishment and modification application. (ACC Grade Separation Analysis) | Table 11 and 12 |
| 2. FHWA Highway-Rail Crossing Handbook, Third Edition | Table 13 and 14 |
| 3. American Association of State Highway and Transportation Officials (AASHTO) | Sec 8.2 and Table 15 |

Grade Separation

Staff accepts the results of the Traffic Impact Analysis Study (TIA) with regard to grade separation warrants. The Sossaman Road south location is currently in design by the Town of Queen Creek and grade separation warrants will be considered with that crossing application in the future.

Ellsworth Road: Staff recommends grade-separated crossing at this location for the following reasons.

- a. Across the three criteria considered, Ellsworth Road does meet the vehicle traffic warrant. The TIA correctly states that these warrants do not constitute a mandate. The guidelines do help model existing and future conditions to help the decision-making process while a decision can be made.
- b. Additionally, the PIRATE industrial area is positioned for growth. Some of the warrants depend on the existing PIRATE customer level which is likely to increase.
- c. 2040 traffic volume projections used in the TIA came from Southeast Mesa Land Use and Transportation Plan (2019) but regional growth including Ellsworth as connector between State Route 24 to the north and the Town of Queen Creek south should be factored in.

Consolidated Rail Infrastructure and Safety Improvements (CRISI) Program

Staff acknowledges here that federal funding source exists that may be applicable to grade separation. The eligibility of projects and administration of funding awards are entirely up to the U.S. Department of Transportation (DOT) and the Federal Railroad Administration (FRA).

<https://www.federalregister.gov/d/2022-19004/p-91>

This is a link to the Notice of funding opportunity (NOFO or notice) that details the application requirements and procedures to obtain grant funding for eligible projects under the Consolidated Rail Infrastructure and Safety Improvements (CRISI) Program for Fiscal Year 2022.

Included under projects that are eligible for funding:

- iii. A capital project identified by the Secretary as being necessary to address congestion or safety challenges affecting rail service.

**Table 11 ACC Grade Separation Analysis Results:
Existing Conditions (2022)**

Railroad Crossing	Warrant Met?								
	1	2	3	4	5	6	7	8	9
Existing Sossaman Road	No	No	No	No	No	No	No	No	No
Proposed Sossaman Road	No	No	No	No	No	No	No	No	No
E Pecos Road	No	No	No	No	No	No	No	No	No
Ellsworth Road	No	No	No	No	No	No	No	No	No
Crismon Road	No	No	No	No	No	No	No	No	No
Signal Butte Road	No	No	No	No	No	No	No	No	No



**Table 12 ACC Grade Separation Analysis Results:
Future Conditions (2040)**

Railroad Crossing	Warrant Met?								
	1	2	3	4	5	6	7	8	9
Existing Sossaman Road	No	No	No	No	No	No	No	No	Yes
Proposed Sossaman Road	No	No	No	No	No	No	No	No	No
E Pecos Road	No	No	No	No	No	No	No	No	No
Ellsworth Road	No	No	No	No	No	No	No	No	No
Crismon Road	No	No	No	No	No	No	No	No	No
Signal Butte Road	No	No	No	No	No	No	No	No	No



As shown in **Tables 11 and 12**, none of the proposed crossings meet any of the ACC Grade Separation warrants under existing or future conditions, however, the existing crossing meets one of the conditions for a grade separation in 2040 due to projected traffic growth on Sossaman Road. It should be noted that the Germann Road Corridor Improvement Study (2013) presents concepts that would grade separate the existing Sossaman Road crossing. Construction of the proposed PIRATE Industrial Lead would not impact the feasibility of that potential project.

³Arizona Corporation Commission Safety Division Procedures for Requesting a New Crossing or Upgrading an Existing Crossing, Revised 11/26/2018

FHWA Highway-rail Crossing Handbook, Third Edition, details conditions to consider for grade separation. While the handbook does not specify which conditions they need to be analyzed in, we have determined that both existing (2022) and future (2040) conditions would provide an overall understanding of the need for a grade separation. These guidelines state "Grade separation should be provided at all limited access facilities and should be considered for whenever one or more of the following conditions exist:"⁴

1. "The posted highway speed equals or exceeds 55 MPH."⁴
2. "AADT exceeds 30,000 in urban areas or 20,000 in rural areas."⁴
3. "Maximum authorized train speed exceeds 79 MPH."⁴
4. "An average of 30 or more trains per day."⁴
5. "An average of 75 or more passenger trains per day in urban areas or 30 or more passenger trains per day in rural areas."⁴
6. "An average of 150 or more transit trains per day in urban areas or 60 or more passenger trains per day in rural areas."⁴
7. "Freight Train Crossing Exposure (the product of the number of passenger trains per day and AADT) exceeds 2,250,000 in urban areas or 600,000 in rural areas."⁴
8. "Transit Train Crossing Exposure (the product of the number of transit trains per day and AADT) exceeds 4,500,000 in urban areas or 1,200,000 in rural areas."⁴
9. "The expected accident frequency for active devices with gates, as calculated by the USDOT Accident Prediction Formula including five-year accident history, exceeds 0.5 (per year). If the highway is part of the designated National Highway System, the expected accident frequency for active devices with gates, as calculated by the USDOT Accident Prediction Formula including five-year accident history, exceeds 0.2 (per year)."⁴
10. "Vehicle delay exceeds 30 vehicle-hours per day with consideration for cost effectiveness."⁴

Table 13 FHWA Grade Separation Analysis Results: Existing Conditions (2022)										
Railroad Crossing	Warrant Met?									
	1	2	3	4	5	6	7	8	9	10
Existing Sossaman Road	No	No	No	No	No	No	No	No	No	No
Proposed Sossaman Road	No	No	No	No	No	No	No	No	No	No
E Pecos Road	No	No	No	No	No	No	No	No	No	No
Ellsworth Road	No	Yes	No	No	No	No	No	No	No	No
Crismon Road	No	No	No	No	No	No	No	No	No	No
Signal Butte Road	No	No	No	No	No	No	No	No	No	No

⁴FHWA Highway-Rail Crossing Handbook, Third Edition

**Table 14 FHWA Grade Separation Analysis Results:
Future Conditions (2040)**

Railroad Crossing	Warrant Met?									
	1	2	3	4	5	6	7	8	9	10
Existing Sossaman Road	No	No	No	No	No	No	No	No	No	Yes
Proposed Sossaman Road	No	No	No	No	No	No	No	No	No	No
E Pecos Road	No	Yes	No	No	No	No	No	No	No	No
Ellsworth Road	No	Yes	No	No	No	No	No	No	No	No
Crimson Road	No	Yes	No	No	No	No	No	No	No	No
Signal Butte Road	No	Yes	No	No	No	No	No	No	No	No

The results from the FHWA grade separation analysis show that only Ellsworth Road meets any of the conditions for recommending grade separation under existing conditions (2022). The future condition analysis shows that each of the existing and proposed crossings (except the Proposed Sossaman Road crossing) met only one of the conditions for a grade separation. For E Pecos Road, Ellsworth Road, Crimson Road, and Signal Butte Road proposed crossings, the AADT warrant is met. For the existing Sossaman Road crossing, the vehicle delay warrant is met similar to the ACC warrant analysis. As cited above, both the ACC and FHWA warrants are prefaced with statements that conclude that these warrants are to be used as guidance for grade separation. Neither methodology mandates or requires grade separation when any warrant is met nor do they account for the width of the roadway which can increase capacity without grade separation at the railroad crossing. Much of the decision comes down to engineering judgement and analyzing the overall conditions.

The proposed siding at the existing Sossaman Road crossing could accommodate passing trains or other non-through train moves. Given this potential, we evaluated how long a train could be occupying the crossing without meeting the ACC or FHWA grade separation warrant for vehicle delay. With Opening Day vehicle traffic, one train per day could occupy the existing Sossaman Road crossing for approximately 10 minutes without meeting the warrant. As demonstrated in Table 12 and Table 14, the ACC and FHWA warrants for vehicle delay at the existing Sossaman Road crossing are met even with through trains only due to the projected increase in vehicular traffic.

8.2 AASHTO Warrants

AASHTO also provides warrants for grade separation however these warrants do not provide specific target values for when grade separation should be considered. Section 10 of AASHTO's A Policy on Geometric Design of Highways and Streets, 7th Edition (2018) outlines specific conditions or warrants to be used when considering a grade separation. These warrants include:

1. Sight Distance
2. Volume and Speed of Traffic along Roadway
3. Volume and Speed of Traffic along Tracks
4. Mix of Users and Modes of Travel

5. Anticipated Crashes

Sight Distance:

Providing clear lines of sight for motorists to see approaching trains is a key element in preventing vehicle/train accidents at railroad crossings. Based on the June 2022 diagnostic meeting and an evaluation of Google Earth imagery from March 2021, each of the proposed and existing crossings have acceptable clearing sight distance for all directions approaching the tracks due to the largely undeveloped land adjacent to the existing and proposed crossings. This can be perpetuated by the City of Mesa through the land development permitting process for the property adjacent to each of the proposed crossings. Also, each of the proposed crossings will have active warning devices installed. These devices will provide motorists warning of an approaching train as well as limit motorists from crossing the tracks when a train is approaching.

Volume and Speed of Traffic Along Roadways:

As detailed earlier in this report, existing ADT volumes have been collected and analyzed at each of the proposed and existing railroad crossing sites. Existing volumes can be found in **Table 2**. We have compared these values to the expected capacity for each of the roadway segments shown in **Table 15**. The capacity values were determined based on generalized service volume tables included in FHWA's Simplified Highway Capacity Calculation Method for the Highway Performance Monitoring System (2017) based on LOS E which represents a volume-to-capacity ratio of 1.0. These tables estimate service volume for signalized highways based on number of lanes, percent green time, and speed limit. For all roadways, it was assumed an average of 60 percent of the green time would be provided to the arterial on a daily basis.

Roadway Segment	No. of Lanes	Speed Limit	ADT	Daily Capacity
Ellsworth Road between E Pecos N Road and E Pecos Road S	4	50	59,211	51,700
Sossaman Road between Germann Road and Rittenhouse Road	2	45	12,114	26,600
E Pecos Road S between Sossaman Road and Power Road	2	45	14,190	26,600
Sossaman Road north of E Pecos Road S	2	45	6,142	26,600

Table 16 – Future (2040) Daily Traffic Roadway Segment Capacity PIRATE Industrial Lead Traffic Impact Analysis Study				
Roadway Segment	No. of Lanes	Speed Limit	ADT	Daily Capacity
Ellsworth Road between E Pecos N Road and E Pecos Road S	6	50	79,766	77,700
Sossaman Road between Germann Road and Rittenhouse Road	6	45	25,600	80,600
E Pecos Road S between Sossaman Road and Power Road	6	45	46,296	80,600
Sossaman Road north of E Pecos Road S	6	45	27,374	80,600
Crismon Road between Germann Road and E Pecos Road N	4	45	40,781	53,600
Signal Butte Road between Germann Road and E Pecos Road N	4	45	35,652	53,600

When comparing the ADT for the existing and future conditions to the capacity of each roadway segment for each condition, we conclude that Ellsworth Road is currently over-capacity under current conditions. The City of Mesa has begun a project to widen Ellsworth Road to six-lanes. This will increase capacity to 77,700, as noted in Table 16, in the near-term. However, by 2040 Ellsworth is again expected to be over-capacity. the railroad crossing is expected to result in minimal additional delay on the Ellsworth Road corridor and with the City's current roadway widening project, which will be accommodated with the at-grade crossing design, the roadway is not expected to reach capacity until 2040. Therefore, grade separation is not warranted in the near-term under this condition.

Speed limits for all roadway segments affected by the proposed PIRATE Industrial Lead are shown in **Table 16**. While these speed limits are high, based on field observations, there are no sight distance concerns and the minimum stopping sight distance can be provided at each of the existing and proposed crossings which will provide motorists the necessary time to stop when an activation occurs. See **Table 17** for the AASHTO Stopping Sight Distance for each roadway segment's speed limit.

Staff Conclusions

Having reviewed all applicable data, Staff supports Railroad's application for establishment or modification of at-grade railroad crossings at;

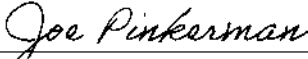
Pecos Road, DOT#980158R
Sossaman Road, DOT#980159X
Crismon Road, DOT#980161Y
Signal Butte Road, DOT#980163M
south Sossaman Road, DOT#741834B

Staff believes that these crossings are in the public's interest and are reasonable. Staff believes that the measures proposed by Railroad are consistent with other similar at-grade crossings in the State and will provide for the public's safety.

Staff recommends the following;
Grade separation at Ellsworth Road, DOT#980160S

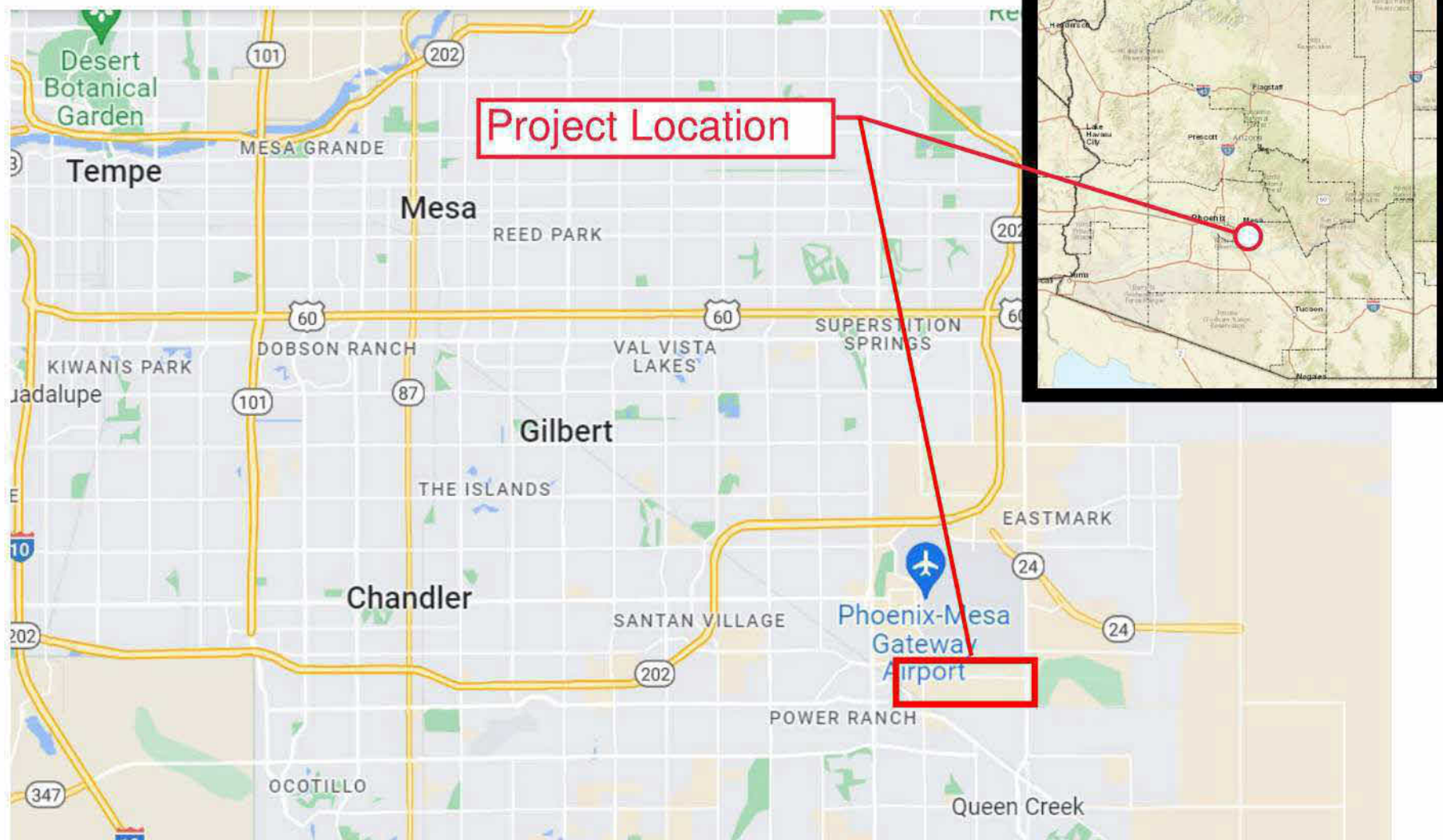
Staff believes that this crossing is in the public's interest and reasonable. Staff believes that the measures proposed are consistent with other similar crossings and the communities around the crossings in the State and will provide for the public's safety.

Therefore, Staff recommends approval of this application as modified in this Staff Memorandum.



Joe Pinkerman
Railroad Safety Supervisor
Safety Division

Originator: JPIKE



Union Pacific Railroad Company Application

Construct five (5) new at-grade crossings-Pecos Road, DOT#980158R, Sossaman Road, DOT#980159X, Ellsworth Road, DOT#980160S, Crismon Road, DOT#980161Y, and Signal Butte Road, DOT#980163M and improve one (1) existing at-grade crossing at south Sossaman Road, DOT#741834B as part of Union Pacific's proposed PIRATE line. City of Mesa, Maricopa County, Arizona.

DKT NO: RR-03639A-22-0287



On this 15th day of December, 2022, the foregoing document was filed with Docket Control as a Staff Report, and copies of the foregoing were mailed on behalf of the Safety Division to the following who have not consented to email service. On this date or as soon as possible thereafter, the Commission's eDocket program will automatically email a link to the foregoing to the following who have consented to email service.

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